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FACILITIES IN EXPERIMENTAL PSYCHOLOGY AT THE  
VARIOUS GERMAN UNIVERSITIES.

BY WILLIAM O. KROHN, PH. D.

The writer returned in March from a sojourn of nine months on the continent. From two weeks to three months were spent at each of the principal German university centers. The time was occupied in a study of men, methods and laboratory equipment at those universities enjoying facilities for work in experimental psychology. Many teachers who contemplate starting laboratories in this country have suggested that we give information in the form of a printed article as to the apparatus used, its cost and value. We have already done this in several instances through the ordinary channel of private correspondence. The present article concerns apparatus only. We hope later to give a sort of pen picture of the men who are now contemporaries in furnishing the instruction in experimental psychology in the several universities of Europe which the writer has visited as well as to present the results of careful and rather extended study of their methods of work. The time was spent at Heidelberg, Strassburg, Zurich, Freiburg, Munich, Prag, Berlin, Leipzig, Halle, Göttingen and Bonn, in the order named. The longest periods were those at Freiburg and Berlin. At each of these universities the laboratories were carefully inspected and in some of them the writer carried on experimental work. In our description, for sake of convenience, we will follow the order given above. The description of the excellent laboratory at Göttingen, however, much to our regret, must be omitted from the present article.<sup>1</sup>

## HEIDELBERG.

Heidelberg was visited in order to learn from Kuno Fischer and Caspari the real trend of psychology and philosophy at the present time, especially to ascertain to what extent the English Associationists, and more particularly Herbert Spencer, had influenced German thought. Fischer is openly opposed to all experimental research in psychology. He regards it as a temporary fad, a side issue, an illegitimate method, lying wholly outside the main stream in the development of psychology as a science. Caspari is much more friendly, and reads lectures on experimental psychology, but does no laboratory work, and has had no laboratory training. To the medical faculty belongs the credit of the projected laboratory at Heidelberg. Prof. Kraepelin lectured on "Physiological Psychology" and succeeded in attracting and interesting enough men to warrant him in offering in a modest way a course of laboratory instruction. His equipment is small and he fails to distinguish between psychological and physiological experiments. Naturally the latter predominate.

## STRASSBURG.

At Strassburg there is no psychological laboratory, but Goltz and his assistant, Ewald, have much to show that is full of interest. Goltz has a large collection of animals—dogs, monkeys, pigeons, salamanders, etc.—from which the cerebrum has been wholly or partially extirpated. Nowhere is vivisection carried on on a larger scale than at Strassburg. Indirectly there is much valuable material to be made use of at this university. Ewald is ingenious as a mechanical contriver. His newly

<sup>1</sup> The material collected for the portion of the article on the laboratory at Göttingen was loaned some weeks ago to a fellow-worker, who wished to order some of the excellent apparatus contained in this list, and has not been returned as yet. The writer makes apology to Professor Müller and Dr. Schumann, and promises to give their laboratory the full treatment it merits, in the next number of the JOURNAL.

invented chronoscope has certain advantages over the Hipp machine and is much cheaper (95 marks). It is described at great length and illustrated by two cuts in a thesis by Otto Dumreicher.<sup>1</sup> The larger size is the more desirable. This little instrument is, in fact, only a counting apparatus which records the number of breaks in an electrical current which passes through the instrument. A tuning-fork that makes a hundred vibrations in a second is a very convenient and simple instrument for the breaking of the current into a number corresponding to the number of vibrations. Thus one obtains the time to be measured expressed in hundredths of a second. The chronoscope then merely counts the number of these breaks in the electrical current, i. e., the number of vibrations made by the tuning-fork. For the purpose of counting these breaks there is in the chronoscope a little electro-magnet which moves a little ratchet in and out. This ratchet or trigger in turn moves a little toothed wheel, which possesses a hundred teeth, and on this wheel is an indicator. In this way the movements of the electro-magnet which is attached to the ratchet are transmitted to the indicator so that a spring or weight is unnecessary. This is one of the most pleasing features of the apparatus, since no winding of clock-work is needed. It is so arranged that the toothed wheel can not be moved backwards, neither can a single tooth be skipped. The instrument can never make a false record. It remains only to speak of the way in which the indicator is brought back to zero. The ordinary complicated arrangement of a stop-watch would not serve the purpose of Prof. Ewald. He has solved the problem in the simplest possible manner. The entire inner part of the chronoscope (electro-magnet, toothed wheel, and indicator) turns upon an axis, while the dial plate over which the indicator moves is fixed and immovable. After each single test one can very readily turn the whole thing, indicator and all, back to zero on the dial plate. The key used by Ewald in connection with his chronoscope is equally ingenious. It consists of a double armed lever so arranged that the current is closed when one presses on the button, but opened as soon as one withdraws the finger. It costs 20 marks, and is illustrated in Dumreicher's paper as well as Majer's catalogue. Ewald's mechanic, Majer, also makes an excellent "inductorium," modelled after that of Du Bois-Reymond, but somewhat improved. It costs from 80 to 100 marks. His pseudoscope should be in every laboratory; it costs but 25 marks. Ewald has also invented a color mixer, which makes it possible to vary the sectors while in motion. It is not only very complicated and expensive (200 marks), but also very unsatisfactory as well. It doesn't always work and is frequently out of order.

Wendelband in his lectures pays some little attention to experimental psychology.

#### ZURICH.

Zurich attracts the psychologist mainly through Dr. Forel. His work is chiefly in the line of psychiatry. In his "Anstalt" one sees much interesting pathological brain matter—indeed the best at any of the German universities. Work in neurology and histology is carried on continually in a well appointed laboratory, which is under the immediate supervision of Dr. Forel. The writer is greatly indebted to this delightful man for showing him many hypnotic experiments. Hypnotism is constantly employed by Dr. Forel in this Anstalt as a means of cure. The clinics in psychiatry supply much interesting material for study and examination. Prof. Avenarius lectures on general psychology, but contributes nothing on the experimental side.

<sup>1</sup> Zur Messung der Reaktionszeit; Strassburg, 1889.

## FREIBURG.

The laboratory of Dr. Münsterberg is distinctively a *psychological* laboratory. A distinction is constantly made by him between psychological and physiological experiments. His laboratory is on a private foundation established by Prof. M. himself, out of his own resources. To use his own figure, "The university authorities appropriate scarcely enough to buy the little bit of quicksilver used." The laboratory has little more than a nominal connection with the university of Freiburg, and is located in two large rooms of his private house. The students work in the laboratory from 11 to 1 each day of the week, though it is open at all hours to such as wish to carry on research work in connection with special problems. His courses are "privatim" but "unentgeltlich." The laboratory is provided by the professor with all the current literature. His apparatus is all practical, designed by himself, and constructed by his mechanic, Elbs. Aside from the staple apparatus to be found in every laboratory (Hipp chronoscope, metronomes, etc.), the following pieces are of especial interest and to be commended for their real value:

1. Muskelsinnapparat. This is the apparatus used by Delabarre in gathering material for his thesis which earned him his doctor's degree. In his paper he has an excellent cut of this apparatus.<sup>1</sup> This apparatus is made for the right or left arm. It is better to have two pieces of this apparatus so as to be able to make bi-lateral movements of the arms for comparison. The following is a brief description: Into a heavy iron stand moves a strong iron rod a little over an inch in thickness, which can be easily elevated or lowered at will, and by means of a screw can be held any height, something on the principle of a music stand or modern piano lamp. Above on this stand, arranged to turn about an axis, is the portion of the apparatus which is more immediately concerned in the experiment. This consists of two small rails, upon which runs a light easily moved car with four small brass wheels. In order to hold the car fast upon the track at any chosen position or angle, there extends out from the under side a piece of metal, which has upon the end a small wheel, that runs along the under side of a third rail. This third rail is midway between and a little above the other two. To the car is attached an indicator, the point of which indicates the position of the car upon a scale 900 mm. long. This scale is fastened upon the side of one of the outer rails and divided into half centimeters; millimeters can easily be measured with the eye. To the top of the car is attached a short hollow brass cylinder, into which the end-joint of the index finger can be placed in order to set the car in motion. Upon the middle track are two clamps, which in every chosen position can be fixed as limits for the movements of the car, if such limits are desired. At each end of the middle track are little pulley wheels, over which a string can be drawn, which is fastened at one end to the little car and at the other to a scale pan, which is used in experiments where the weight of the wagon is to be compensated or where the movement of the car by means of a weight is to be made more difficult or easier. The portion of the apparatus consisting of the rails and car is movable about an axis and can be made to stand at any angle between the horizontal and vertical position. Thus the car can be moved horizontally or vertically, or at any incline. By means of the compensating weights in the scale pan, the resistance of the moving car is almost entirely done away with. The apparatus is well made and lends itself to a multitude of conditions, and is exceedingly useful for many purposes. Price 130 marks.

2. A very convenient chronoscope, incased in wood so as to lessen the noise. It measures hundredths of a second very accurately and is

<sup>1</sup> Ueber Bewegungsempfindungen. Pub. by Epstein in Freiburg, i. B., 1891.

very useful in ordinary reaction-time work. It runs twenty minutes without re-winding. It is not electrical, but runs by springs. It is much more convenient than the Hipp chronoscope. It costs 200 marks.

3. Augenmassapparat. This consists of a wooden board about 600mm. long and 500 mm. high, standing upright on its side edge. It is covered with very dark green felt, since this color is less fatiguing to the eye. At the back of the board are two scales, one vertical, the other horizontal. These scales are sliding and divided into millimeters. By turning a screw, the scale, either vertical or horizontal, may be moved, and in moving the scale the two white points on the front of the board are moved nearer to each other or away from each other at will. The exact distance can be read in millimeters by referring to scale on the back. The subject is made to judge distance moved as compared to a certain norm or standard given at the beginning of each test. Thus the method of average error is the one employed. Münsterberg has made over 30,000 tests with this piece of apparatus.

4. A key-board for reaction-time determinations, consisting of 50 buttons in electrical connection. These buttons can be labeled to suit the experimenter. Price 19 marks.

5. Schall-apparat. This apparatus is constructed for the purpose of determining the direction of sound. It consists of a very small box containing electrical apparatus, that makes the ticking noise, which acts as auditory stimulus. This is enclosed in a large oak box, deadened by a lining of felt and zinc, and the space between the two boxes filled with water. The electrical apparatus can be set going from without by means of a small Grove cell battery. Through one side of the outer box are inserted 3 iron tubes that enter the inner box, and through which the sound can be transmitted. To these are attached rubber tubes about four feet long, at the end of which are bell-shaped gutta-percha cups that fit over the ear; these can be held at any angle, and thus the sound made to come from any direction. The subject then makes his judgment as to the direction in each case. It is a very convenient and ingenious device, and cannot be gotten out of order. Price 60 marks.

6. Fall-apparat, costing 20 marks.

7. Sphygmograph, 250 marks.

8. Color-mixers which are run by electricity are also to be recommended for their simplicity of construction and their general satisfactoriness. The laboratory also contains a "Ton-messer" of large compass constructed by Appum of Hannau, a / m.

A word ought to be said with reference to Münsterberg's method of instruction. He sets apart each day for some specific class of experiments. Thus, Monday might be the "color-day," in which the students have the advantage of seeing all the apparatus connected with color-work. Tuesday would be the "sound-day," in which the experiments concerned sound alone. Wednesday would perhaps be devoted to psychometric methods, and so on through the week. After several weeks of this sort of introductory work, the students who are inclined select special problems for research, and others assist the professor in carrying on his own investigations. During the past year the professor has made many thousands of experiments that bear upon the general subject of daily rhythm. Some of this material will be treated in his paper at the congress to convene in London this summer. Professor Flournoy, in establishing his laboratory at Geneva, ordered duplicates of all of Münsterberg's apparatus.

Mention must also be made of Prof. von Kries, who is located at Freiburg with one of the best equipped physiological laboratories in the world. It is in a large, brilliantly appointed building, recently constructed, and well supported in a financial way by the government of

Baden. The lectures by this professor on the "Physiologie der Bewegung u. Empfindung" are replete with interest for the psychological student as well as are some of his practice courses in the laboratory under his immediate direction.

#### MUNICH.

At Munich there is no university laboratory in experimental psychology. But this does not imply that the students in this university are entirely without facilities in this line, for Professor C. Stumpf has a very useful though unpretentious collection of apparatus for sound experiments accumulated by him in order to carry on that large amount of experimental work in this field, in which he is recognized as an authority, and in which he has labored so assiduously. His methods are of the most painstaking sort, and "exactness" is a fitting label for all his experimental work. He works the same problem over and over again regardless of time involved, subjects all his results to a revision in which the most exacting tests are used, confirming and reconfirming his previous conclusions, and all this time aware that the world is awaiting his long promised third volume on "Ton-psychologie." He has an especially constructed "Ton-messer" (Appum), and the best series of forks found anywhere, which were taken from a piano constructed entirely of tuning forks. He uses much other apparatus along the other lines of psychology to illustrate his lectures in the class room.

The writer is indebted to Dr. Freiherr von Schrenck-Notzing, who showed him much in the way of hypnotic experiments. This well known physician constantly makes use of hypnotism as a therapeutic agent. He is also a close student of psychology, as Stumpf, Edward von Hartmann and others testify. Schmidkunz, a young man, lectures at the university on hypnotism once a week. Stumpf's lectures on applied psychology or pedagogics constitute an interesting and valuable course.

#### PRAG.

In the German university at Prag, Prof. Marty has a small collection of apparatus for purpose of illustration. It is on a very small scale, and no research work is done in psychology. Professor Hering's work in connection with the physiology of the end-organs of sense makes his laboratory an interesting place for the psychologist. The laboratory or institute consists of ten very large and well appointed rooms; the professor has three assistants. His mechanic, Herr Rothe, will furnish catalogue of instruments on application. Some of the apparatus for color work is absolutely indispensable to the well-equipped psychological laboratory.

It might also be mentioned in passing that Herr Fric is located at Prag, from whom excellent models, charts and prepared tissue can be secured.

#### BERLIN.

Professor Ebbinghaus is at the head of the work in experimental psychology at the Berlin University. The authorities have set aside two rooms for his use. He has but little apparatus—Hipp chronoscope, tuning forks, brain models, metronomes, and in general such pieces as are found in every laboratory. Special mention must be made of a color-mixer so designed that one can change the sectors without stopping the machine. It is very ingeniously conceived, but poorly made by the mechanic. Professor Ebbinghaus is exceedingly clear in his lectures, which are well attended, and he deserves from the powers that be, better support in a financial way to carry on the work in experimental

psychology, work which he has well begun and for which he is so admirably fitted. It is greatly to be regretted that Germany's largest university is not better equipped with apparatus.

Munk's work at Berlin is very similar to that of Goltz at Strassburg. His lectures should be attended by all students in psychology who have the opportunity of studying at Berlin. His work in extirpation is always of profound interest. One of his students, Dr. Max Dessoir, who has recently distinguished himself by an elaborate series of interesting and important experiments upon the sensations of the skin, has just been made docent in the university. He proposes to extend the study to all the other senses as rapidly as he is able to do so. His work in connection with the temperature sense was carefully observed by the writer of this paper, with interest and profit. This young investigator has through his recent publications put some new and valuable material into the hands of psychologists. His lectures are upon "Psychological Basis of Aesthetics." The student at Berlin has access to Goldscheider, Preyer, Du Bois-Reymond and Helmholtz, besides the advantage of hearing Zeller, Lazarus, Dilthy, Döring and Paulsen. There is in Berlin a society composed of men interested in experimental psychology, which holds meetings every two weeks, at which a paper embodying the results of original work is read by some member or invited guest. These papers are afterwards published in the society's "Transactions." Dr. Dessoir is secretary of the Berlin society, and Dr. von Schrenck-Notzing of a similar one at Munich. They partake in some degree of the nature of the American Society for Psychical Research. Dr. Moll, the hypnotist, who is no less a psychologist, is a member of the Berlin society.

#### LEIPZIG.

Professor Wundt's laboratory is so well known, and his apparatus has found way into so many places, that perhaps it needs no detailed description, and yet the writer feels justified in giving a complete list in the hope that it will be of some assistance to those who are projecting laboratories—the persons for whom this article is chiefly written. Some of the apparatus is a little antiquated and has been superseded. Still, even this is useful for the purpose of illustration and verification. Professor Wundt has two able assistants in Dr. Külpe and Dr. Kirschmann. The laboratory or "institute," as it is officially styled, embraces six rooms conveniently arranged and tolerably well lighted, but with poor floors. Wundt contemplates moving to other quarters. The apparatus consists of one new Hipp chronoscope, price 282 marks. One Kugelfallapparat to test chronoscope; this is of little value and now seldom used, 64 marks. One large control hammer, which occupies 7 tenths of a second in falling; this is for the purpose of regulating the chronoscope, is finely constructed and costs 275 marks. It is accurately described in the last number of the *Phil. Studien* (Vol. VIII., page 145 ff.) by Külpe and Kirschmann. Cuts of the instrument are shown in connection with this article. One rheochord, 15 marks; one Fallapparat with a slit in the plate displaying the letter or word, 125 marks; one Fall-chronometer with automatic contact (Cattell), 145 marks. This is described in the *Phil. Studien*, Vol. III., pp. 307 ff., and is a very useful piece of apparatus. One "Sprech contact-apparat," in which the current is made or broken by speaking into a membrane-covered drum, costs 33 marks; one Schall hammer with electrical connections, so that it strikes when current is made or broken; metronomes with and without bells, 12 and 15 marks respectively; one adjustable electro-magnet with stative, 9 marks; color mixers, run by clock-work, 54 marks each; the same with governors attached, 64 marks; one electric chronographic tuning fork of 250 vibrations, 90 marks; the same

(Helmholtz) with 125 vibrations, 75 marks; tuning forks mounted on resonant boxes, cost according to size; one reaction apparatus of ten buttons in electrical connection (Merkel), 56 marks. One large, heavy pendulum with horizontal and vertical slits in the bob. The subject, looking through tube as the pendulum passes, discerns the letter or word back of the pendulum, as it is displayed through the slits when the pendulum oscillates to and fro. Two adjustable magnets, reaction-time studies of light impressions, 275 marks. One chronograph for the measuring of very short time-intervals, consisting of large drum revolved rapidly by means of heavy weight. There is a cut of this apparatus in Wundt's *Phil. Studien*, Vol. IV., p. 458. It is extremely expensive, costing 700 marks; the same results can be obtained by a revolving drum propelled by a little three-dollar electric motor. One *Zeitsinnapparat* with six contact keys. This consists of a vertical drum revolving within a circle on which is a graduated scale. To this circle can be attached six contacts at different distances, the distances read in degrees, minutes and seconds by referring to the scale. A point on the drum in revolving touches these separate contacts in turn, thus making a current at each contact, which is communicated to an electric bell or hammer. The subject then judges and compares the time intervals between the sounds; costs without drum 124 marks. It runs by weights. It is described by Ester in the "*Studien*," page 38 of volume II. With the large drum and recording apparatus it costs 350 marks. One large *Fallapparat* with 4 electro-magnetic ball-holders. This is the piece of apparatus used by Professor Angell of Stanford University when at Leipzig in determining, according to the method of average error, the estimation of various intensities of sound. The apparatus consists of 4 upright polished iron or nickel rods, on each one of which is a little holder for the small ball. In making the current these holders drop the balls upon a block of ebony. As the balls are elevated more and more the sound becomes more intense. With four of these upright standards four successive sounds of different intensities can be obtained without re-adjustment. This piece of apparatus is more fully described in the "*Studien*," Vol. VII., p. 425. One 3-fold diaphragm with an arrangement whereby the square holes can be readily adjusted, by means of a micrometer screw, to various sizes. Through these holes one looks at sheets of colored gelatine paper. The object of this apparatus is to experiment upon the relation of color to the apparent size of the surface. The apparatus was designed by Dr. Kirschmann, and is described and illustrated by him in Vol. VI. of the "*Studien*," page 432. One large chronoscope used for demonstration purposes in the class room; it has a large ground glass dial, 40 centimeters in diameter and lighted from behind like the dial of a tower clock. Costs 400 marks. An apparatus for the demonstration of after images costs 48 marks. A similar apparatus for demonstration purposes by means of which one compares the endurance of the after images of sound and light, 60 marks. One model illustrating the movements of the eye, 45 marks. One model demonstrating the retinal images, 34 marks. One large "rotation-apparat," a sort of colossal lecture room color mixer, costs with colored disks 175 marks. To this list must be added various keys, contacts, commutators, which are as a rule much better made in America. Any or all of the above apparatus can be secured from Wundt's mechanic, Herr Krille.

One of the most important pieces of apparatus, because of its utility, is the *Baltze kymograph*. It is absolutely indispensable—more so than the chronoscope—to a laboratory in experimental psychology. The late one is much improved over previous ones, and is shown pretty well in a cut on page 19 of Langendorff's new book, "*Physiologische Graphik*."

Only two psychological laboratories in all Germany were equipped

with this admirable piece of apparatus, the one at Leipzig and the one at Bonn. The following is a brief description:

A carefully turned hollow brass cylinder is set in rotation by means of a finely constructed piece of clock-work, which is contained in a brass box. This clock-work is regulated in its going by a pair of governing fans, after the principle of Foucault. A small lever serves to start and stop the clock-work. The clock-work turns a horizontal metal axis, to the end of which is attached a metal disk (about five inches in diameter), and which in rotating turns by means of friction the upright axis of the drum or cylinder already mentioned. By a simple and sure device the speed of the rotating drum can be accurately regulated. The drum can be made to turn in a horizontal as well as vertical position, and also has a little attachment whereby use can be made of a little electric motor or a heavy weight, if very great rapidity is desired. The drum of the new Baltze apparatus has a height of 13 centimeters, and is 50 centimeters in circumference. This drum is covered with a strip of smoked paper, on which are traced the curves. By a series of exchange wheels, in different combinations, the kymograph can be made to rotate the drum anywhere between 3 seconds and 90 minutes. By using a weight and tying down the governors (which can be done without injury), Tigerstedt succeeded in turning the drum at such a rate that every millimeter on the paper corresponded to .0016 seconds in time. The student in psychology at Leipzig has also the advantage of Ludwig's renowned "Physiological Institute." Baltze, who contrived the kymograph which we have attempted to describe, is Ludwig's mechanic. Wundt delivers lectures on history of philosophy, but no lectures on psychology, leaving the latter task to his assistant, Külpe, whose long laboratory training gives him a fund of material for illustrations along every line of experimental work. Glockner's lectures on pedagogical psychology, as well as those of Leydl, are exceedingly interesting and valuable. Ludwig's lectures on "*Empfindung* and *Bewegung*" are more *psychological* than physiological, and should be down on the schedule of every student who pretends to study psychology at Leipzig.

#### HALLE.

At Halle there is no laboratory at present in experimental psychology, though one is contemplated. The writer visited Halle to confer with Professor Uphues and Dr. Huffert, as well as to hear Benno Erdmann in his lectures.

#### JENA.

It was impracticable to include Jena in our "Rundreise," much to our regret. However, Dr. Ziehen of the medical faculty, lectures on physiological psychology, and his courses are very popular. His lectures have just been published in outline, and a helpful and suggestive book they make. He also lectures on brain-anatomy (*privatim*), and on psychiatry (*publice*), both one hour a week courses. Professor Biederman in the practice courses in his "Physiological Institute" offers much of interest. He is, as his record as a lecturer and writer shows, most deeply interested in psychology in its modern garb.

#### BONN.

The psychological laboratory at this university has an interesting history indeed. Toward the end of the year 1887, Professor Lipps, now in Breslau, and Dr. Martius, the psychologist at Bonn, proposed to the philosophical faculty and university senate that appropriate rooms be set aside for the purposes of experimental psychology. Through a

lecture on the "Aims and Results of Experimental Psychology,"<sup>1</sup> this endeavor became widely known. The existence of the present laboratory was, however, not the result of these overtures, which were rejected at the time.

The rooms in which the psychological investigations are at present made belong to the Physical Institute. They were generously placed at disposal by Professor H. Hertz, the famous electrician and successor to Professor Clausius. The psychological laboratory at Bonn must, for the present, be looked upon as a private undertaking; it does not enjoy the patronage of the state. The admission of the students occurs in the form of a "privatissimum."

The arrangements are in general copied after those of the Leipzig laboratory, nearly all the apparatus being duplicate of Wundt's own. The most important instruments are all at hand. One of the late acquisitions is a Baltze kymograph of the most excellent workmanship. There is also an improved form of the Angell apparatus for investigations along the line of sound-intensity. The rooms, four in number, are admirably adapted to the purpose for which they are used. Indeed there is no psychological laboratory in all Germany equally fortunate in this respect. The dark room is a little gem, and a model of its kind. For the rest we shall let Dr. Martius speak for himself, and append a quotation from an interesting letter, which was, however, not written primarily for publication.

"The participation of the students in the investigations is naturally small. There is lack of such as are inclined to devote themselves for a long time constantly to psychological investigations. Workers are always present, but the facilities exceed the demand.

"This brings up the question: To what extent should the students take up independent work in the psychological laboratory? The experimental method in psychology has achieved such brilliant success that a scientific treatment of psychology which is not based on this foundation has become at the present day inconceivable. The fundamental facts of mental life, the sensations and perceptions, can be investigated only in this way. Moreover, the truth that a thorough knowledge of the facts of consciousness is the proper foundation for the remaining philosophical disciplines is daily receiving wider recognition. Thus the progress of psychology and philosophy depend to no small degree upon the development of experimental psychology. Wundt once made the remark that he expected to live to see every university in Germany provided with a psychological laboratory. If a retrograde movement does not occur, this expectation will surely be soon realized. The state authorities in the very interests of their universities will not be able to withdraw from the responsibility of furnishing a solution of this problem.

"This, however, does not decide how far the independent psychological investigations in the laboratory are to be open to the student. It appears to the writer not to be in the interest of psychology itself for this to occur to too great an extent. What every student who is to be examined in psychology (and also every student of medicine) ought to know, can be presented in lectures, provided the proper apparatus and lecture-rooms are at hand. The psychological work itself, on account of its difficulty, should be reserved for a limited number, who have a special interest in and enthusiasm for the subject. The future academic instructor in psychology should have a thorough preliminary psychological training if he is to be anything more than a historian and interpreter of psychological systems. For the purposes of instruction, however, lectures well supported by demonstrations are sufficient. It

<sup>1</sup> "Ueber die Ziele u. Ergebnisse der Exper. Psychologie." Bonn, 1888; 5 pp.

is, moreover, to be expected that with such limited and modest demands the authorities will be more inclined to keep pace with the progress of the times."

Dr. Martius lectures twice a week (*privatim*) on *Grundzüge der Psychologie* (with demonstrations), and directs research work one hour each day (*privatim* and *gratis*). Professor Neuhauser lectures on general psychology four times a week. Professor Nussbaum of the medical faculty lectures on the "Anatomy of the Sense-organs," Dr. Koch on the "Physiology of the Sense-organs," the former two hours, and the latter once a week. The latter also lectures on hypnotism, sleep and narcosis. Professor Schaeffhausen lectures on anthropology twice per week. Pflüger's "Seminar" is given over largely to subjects of great interest to the psychological as well as the physiological student. Meyer lectures four times a week in a charming manner upon history of pedagogy.

This concludes our description, which is of necessity "sketchy," and in a measure incomplete as to details. We shall take pleasure in answering inquiries of those wishing more detailed information.

### UNCONSCIOUS SUGGESTION.

During the summer semester of 1891, I gave a course of lectures on hypnotism in the auditorium of the Burghölzli Asylum (Zürich) to the students of the medical faculty of the university. At one of the lectures the young and intelligent attendant K. from Würtemberg was used for purposes of demonstration. After a few suggestions he fell at once into a deep sleep. I then gave him various post-hypnotic suggestions of a hallucinatory character, which succeeded well. In a water-bottle he saw several gold-fish that were not there; he saw a suggested cat, felt of and stroked her, etc. I then suggested to him in hypnotic sleep that on waking he should feel a strong desire for defæcation and that he should ask me for permission to leave the room immediately. He was scarcely awake before he complained to me in a low voice and asked to be allowed to leave the room. I allowed him to go and thought no more about him. A few hours later the assistant physician told me that the attendant K. had been attacked with violent diarrhœa and vomiting, together with headache. He had attempted to suggest these symptoms way, but in vain. I had the attendant called to me, as it was evident that my suggestion had had a much stronger effect than I had intended—a thing that as good as never occurs with me. After K. had recounted the symptoms of his suggested cholera I hypnotized him again and declared briefly and decisively that all his symptoms were past and that in the future he would never again experience anything more than would be contained in my suggestions. On awaking he declared that he was perfectly well and departed. On the next day I asked him how he felt and he replied that he was perfectly well, with the exception of a slight headache. This astonished me, as I knew that headaches are very easily suggested away. I asked concerning the nature of these headaches and he answered me in these words: "I have had these headaches for two years (he had been only a few weeks in the asylum as attendant). At that time I had an inflammation of the lungs (pneumonia) and with it severe headaches. The physician said to me that these headaches would never leave me again, as they were an inheritance from my father. In fact I have never completely lost them since then. Sometimes they are more severe, sometimes weaker, but even when I am in the best condition I always have a dull feeling of pressure in the head."

This declaration of the young man opened my eyes. That he was very suggestible had been proven by the intense effect of the previous suggestion. It now seemed to me highly probable that his two year headache was nothing else than the result of an unconscious suggestion